STRUCTURE, BUSINESS DEMOGRAPHICS *and* INNOVATION *in* BURNIE

Tasmanian Innovation Census Working Paper Series
TIC/0409

Structure, Business Demographics and Innovation in Burnie

Kieran O'Brien, Anthony Arundel and Sophie Jerrim

September 2009

Australian Innovation Research Centre
University of Tasmania

Contact:
Kieran.Obrien@utas.edu.au
anthony.arundel@utas.edu.au
Sophie.Jerrim@utas.edu.au

Working papers should not be reproduced without permission of the author(s).

ISSN: 1836-4969

Phone +61 3 6226 7384 Facsimile +61 3 6226 7390 Email airc@utas.edu.au Internet www.airc.utas.edu.au
Level 5, Galleria Building, 33 Salamanca Place, Hobart Private Bag 108, Hobart TAS 7001 Australia

CONTENTS

1 EXECUTIVE SUMMARY

This report explores the industry structure, business demography and innovation activity for firms in the Burnie region in relation to the rest of Tasmania, based on a retrospective analysis of data from the AIRC Tasmanian Innovation Census (TIC) of all firms in Tasmania with 5 or more employees.

In the Burnie region, the TIC target population consisted of 110 firms. Completed questionnaires were received from 62 of these firms, for a response rate of 56.4%. The Burnie region is defined as the Burnie Local Government Area, and results for the Burnie region are compared against all respondent firms located outside of the Burnie region.

Characteristic differences in the Burnie industrial and business landscape in relation to the rest of Tasmania include a greater reliance on manufacturing and resources, utilities and construction sectors, with a smaller number of larger businesses accounting for greater shares of employment, and a much larger share of regional sales derived from export markets. Despite making up the greater share of firms, the service sectors are less important economically in terms of turnover and employment, with smaller firms and output in the knowledge intensive business services.

By reviewing the innovation characteristics of firms in Burnie using a number of standard indicators for innovation type, inputs, outputs, collaboration, and some more recently developed 'innovation mode' metrics we were developed a profile of innovative activity in the region.

Despite the slightly lower share of firms innovating in Burnie a larger share of employees work for innovative firms than in the rest of the state, indicating the importance of innovation to the region. New to enterprise process innovation is the prevailing type of innovation, while investment in new machinery and equipment and training for innovation are the dominant input activities. The majority of innovation sales are from significantly improved products, and a high share of firms in Burnie are collaborating, with firms accessing mainland and overseas collaboration networks. Using innovation output mode indicators showed that the distribution of firms by innovation intensity is similar to that in the rest of the state, though firms in the highest category of innovation intensity account for a much larger share of employment in Burnie, raising questions about the role of innovation novelty in firm output and growth. Modes by industry indicated relative differences in the sectoral mix of innovation intensities.

We conclude by outlining some potential areas for further investigation to build on the regional profile developed in this report, and to deepen the understanding of issues around improving regional innovation capacity and performance. Potential topics include:

- Barriers and drivers to innovation and growth in services firms, in particular knowledge intensive business services
- Innovation modes and novelty and firm performance
- A review of research on policies and programs for growing KIBS in regional economies

- ICT as an input to services innovation and the impact of the National Broadband Network infrastructure
- Novelty in product and process innovation and value-adding

This paper is a revised version of a report commissioned by the Burnie City Council. Opinions and conclusions are those of the AIRC authors only, and do not necessarily reflect those of Burnie City Council.

2 INTRODUCTION

In recent years the globalisation of markets has led to increasing pressure on many established industries in the Burnie region, decreasing the scale of some traditional economic activities and escalating the need for diversification of the industrial base to both maintain and increase regional prosperity. Policy makers now recognise that the capacity of firms to innovate is crucial to the competitiveness of regional economies, and innovation is becoming more central to regional policy and planning[1].

Building on and developing innovation capacity and performance in firms across all industries in the Burnie regional economy will be critical to future growth, employment and prosperity.

Improved understanding of the dynamics and characteristics of innovation in Burnie is needed to better inform policies around stimulating innovative activity and promoting economic growth. How does the nature of the innovation process differ across traditional and non-traditional sectors in the regional economy and what sectors might be important in the future? How does the nature of the innovation process differ between the Burnie region and the rest of Tasmania and what aspects of innovation performance might be improved?

Better data, measures and indicators of innovation are required to address these questions and progress understanding of regional innovation issues. This report seeks to explore innovation in the Burnie region within the context of the regional economic structure, reviewing firm level performance across a number of standard innovation indicators as well as some more recently developed metrics.

3 METHODOLOGY

The specific approach of this report is to present a quantitative snapshot of the industry structure, business demographic landscape and innovation activity in the Burnie region, based on analysis of data from the AIRC Tasmanian Innovation Census. The report seeks to review firm level innovation capabilities, performance and impacts within Burnie, and regional specificities in relation to the rest of the state.

[1] See for example, Cook, P. *Strategies for Regional Innovation Systems: Learning Transfer and Applications,* United Nations Industrial Development Organisation, Vienna, 2003; Garrett-Jones, S. *From Citadels to Clusters: the Evolution of Regional Innovation policies in Australia*, R&D Management, 34, 1, 2004.

All data are from the Tasmanian Innovation Census (TIC) of private sector firms in Tasmania in 2006. The census used telephone interviews to obtain data on innovation activities, investment in innovation, sales from innovative products, research and development activities, collaboration, and business demographics such as ownership structure, exports, turnover and employment. The TIC followed the OECD guidelines for the collection of innovation statistics.[2] The questionnaire is attached in Appendix A.

The target population for the TIC consisted of 2807 eligible private sector firms with five or more employees, drawn from all sectors of the Tasmanian economy. Of these, 1591 firms completed the questionnaire, giving a response rate of 56.7%. A follow-up survey of a sample of non-respondents found no statistically significant differences in the proportion of innovators among the non-respondents compared to the respondents, indicating that the census results are unbiased.

The main reference period for the census is the three-year calendar period 2004-2006. Financial data on innovation expenditures were obtained for the financial year ended on or before 30 June 2006. Data on exports, turnover and employment were collected for both the 2004 and 2006 fiscal years.

In the Burnie region, the target population consisted of 110 firms with five or more employees. Completed questionnaires were received from 62 of these firms, for a response rate of 56.4%. The Burnie region is defined as the Burnie Local Government Area (LGA)[3]. Results for the Burnie region are compared against all respondent firms located outside of the Burnie region. [4]

Due to the small number of eligible and responding firms in the Burnie region, the results are aggregated to protect confidentiality to four sectors (resources, utilities and construction, manufacturing, knowledge intensive business services and general services) and four firm size categories (5 to 9 employees, 10 to 19 employees, 20 to 49 employees, and 50 or more employees). The four sectors are given in Table 1. For some results it is only possible to present data for the entire Burnie region.

The results in this report are based on information provided by the respondents to the census. Consequently most results provide percentages or are given per employee or firm. No absolute financial or employment results are given for the Burnie region or for 'all other Tasmania' because these results would not include data for the non-respondents and would therefore underestimate the true values. Conversely, we can

[2] The OECD Oslo Manual, Third edition 2005.

[3] The Australian Standard Geographical Classification (ASGC) (ABS cat. no. 1216.0) defines an LGA as a spatial unit representing the whole geographical area of responsibility of an incorporated Local Government Council. Firms in the TIC population list were assigned to an LGA in Tasmania based on the post code of the firm's street address. Post codes were matched to LGA using the Local Government Association of Tasmania's Localities Index in 2007.

[4] The comparisons were first made using two comparator groups: 1) firms located in all other urban areas of Tasmania (Burnie, Clarence, Devonport, Glenorchy, Hobart and Launceston) and 2) all other Tasmanian firms. However, there were very few differences in these two comparison groups, with a few minor exceptions. For simplicity, the comparator group in this report is therefore limited to all other Tasmanian firms.

assume that shares and percentages are similar between the respondents and non-respondents[5].

Table 1. Aggregated industry sectors - ANZSIC 2006 Divisions

Resources, utilities and construction	Manufacturing	Knowledge intensive business services	General services
A. Agriculture, Forestry and Fishing B. Mining D. Electricity, Gas, Water and Waste Services E. Construction	C. Manufacturing	J. Information Media and Telecommunications K. Financial and Insurance Services L. Rental, Hiring and Real Estate Services M. Professional, Scientific and Technical Services N. Administrative and Support Services	F. Wholesale Trade G. Retail Trade H. Accommodation and Food Services I. Transport, Postal and Warehousing O. Public Administration and Safety P. Education and Training Q. Health Care and Social Assistance R. Arts and Recreation Services S. Other Services

Note: All respondent firms were coded to the Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006.

4 THE BURNIE REGIONAL ECONOMY

4.1 Distribution of firms by industry and size class

Table 2 gives the distribution of the target population and respondent firms by aggregated sector for the Burnie region. The close match in distributions indicates a good level of representation in the response data, though manufacturing and resources, utilities and construction firms are slightly over-represented among the respondents, while services firms are slightly under-represented.

[5] Although AIRC is confident in the quality of the coverage - the quality of the population list has been comprehensively checked against every available source - there are likely to be random variations between the respondent and non-respondent groups. These and other methodological issues are discussed in greater depth in the working paper *Technical and methodological issues in the Tasmanian innovation census*, available through http://www.airc.net.au.

Table 2. Distribution of the Burnie region target population and respondents by sector		
	Burnie target population (110 firms)	Burnie respondents (62 firms)
Resources, utilities and construction	13.6%	16.1%
Manufacturing	20.0%	22.6%
Knowledge intensive business services	23.6%	21.0%
General services	42.7%	40.3%
Total	**100.0%**	**100.0%**

For responding firms, the sectoral composition in Burnie largely consists of services with 61.3% of firms, followed by manufacturing with 22.6% and resources, utilities and construction with 16.1% (see column 2 of Table 2). Compared to the rest of Tasmania, the Burnie region has a higher share of manufacturing and resources utilities and construction firms and a lower share of service sector firms.

Apart from Table 2, TIC figures and data provided in the rest of this report refer to responding firms only.

Table 3 shows the distribution of firms by size class in Burnie and for the rest of Tasmania. Just over two-thirds of firms in the Burnie region have less than 20 employees and 14.5% have over 50 employees. The distribution of firms by size is similar to that for the rest of Tasmania, with the exception of a slightly greater share of firms in Burnie with 50 or more employees (14.5% versus 12.8% in the rest of Tasmania) and slightly smaller share with 20 to 49 employees.

Table 3. Distribution of firms by size class, 2006		
	Burnie	All other Tasmania
5 – 9 employees	37.1%	37.6%
10 – 19 employees	30.6%	29.2%
20 – 49 employees	17.7%	20.4%
50 or more employees	14.5%	12.8%
Total	**100.0%**	**100.0%**

Note: Employee data are in full time equivalents (FTEs)

Table 4 gives the percentage of all employees by the size class of their employer. In the Burnie region, larger firms with more than fifty employees account for a much greater share of total employment (72%) than for the rest of Tasmania (60.1%), while firms with less than 20 employees only account for 14.8% of all employees in the Burnie region compared with just over 20% for the rest of Tasmania.

Table 4. Employment share by size class		
	Share of total employment (%)	
Firm size class	Burnie	All other Tasmania
5-9 FTE	6.0	8.1
10-19 FTE	8.8	12.6
20-49 FTE	13.1	19.2
50 or more FTE	72.0	60.1

The distribution of total employment in the Burnie region is also more concentrated in large firms than for all of Australia, where firms with more than 50 employees account for around 40% of total employment[6].

4.2 Sectoral distribution of turnover, employment and exports

The distributions of firms by sector and size are not necessarily indicative of their economic contribution to the Burnie economy. In the absence of data for gross value added, sectoral shares of total turnover, employment and exports are used to provide a picture of the private sector economy (for firms with more than five employees) in the Burnie region. Table 5 gives the distribution of total turnover and employment by industry sector.

Table 5. Distribution of total reported turnover and employment by sector				
	Turnover		Employment	
	Burnie	All other Tasmania	Burnie	All other Tasmania
Resources, utilities and construction	34.6%	18.1%	20.6%	19.1%
Manufacturing	34.8%	28.0%	44.8%	24.2%
Knowledge intensive business services	7.8%	20.3%	5.4%	17.2%
General services	22.8%	33.6%	29.2%	39.5%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The resources, utilities and construction share of total turnover in the Burnie region is almost double the share for the rest of Tasmania, while manufacturing in Burnie also accounts for a relatively larger share of turnover. Conversely, the service sectors account for much smaller shares of total turnover in the Burnie region, particularly for knowledge intensive business services.

[6] See OECD, *Measuring Entrepreneurship: A digest of indicators*, OECD-Eurostat Entrepreneurship Indicators Program, OECD, Paris, 2008.

In terms of employment, the manufacturing sector in Burnie is relatively more important for the regional economy, accounting for 44.8% of business sector employment compared to 24.2% for the rest of Tasmania. Knowledge intensive business services represent a much smaller relative share of employment, accounting for 5.4% of total employment in Burnie compared with 17.2% for the rest of Tasmania.

4.3 Exports

Table 6. Exports by region

	Burnie		All other Tasmania	
Sales destination	**Share of firms with sales (%)**	**Share of total sales (%)**	**Share of firms with sales (%)**	**Share of total sales (%)**
Within Tasmania	93.5	36.5	95.1	65.3
Mainland Australia	46.8	32.9	38.8	17.4
Outside of Australia	12.9	30.6	17.5	17.3
Total		**100.0**		**100.0**

Table 6 shows the share of firms reporting sales to domestic, mainland and overseas markets, and the share of total sales to those markets. Of note is the regional disparity between sales distributions by destination markets, with export markets accounting for a much larger share of total sales in Burnie. Despite a smaller share of firms in Burnie reporting sales outside of Australia (12.9%), overseas markets account for 30.6% of all sales compared with 17.3% for the rest of the state. Mainland markets are also more important for the Burnie region with 32.9% of total sales compared with 17.4% for the rest of Tasmania. The share of firms reporting domestic sales is similar for each cluster, though domestic markets are comparatively less important for Burnie in sales volume. Resources, utilities and construction and manufacturing sectors are driving the higher export shares in Burnie (both mainland and overseas), though in Burnie KIBS derives a relatively higher share of sales from overseas markets than it does in the rest of the state.

5 THE NATURE OF INNOVATION IN THE BURNIE REGION

Above we explored the industrial and business landscape in Burnie using TIC response data, noting characteristic differences in relation to the rest of Tasmania: Burnie is more heavily reliant on manufacturing and resources, utilities and construction sectors, with a smaller number of larger businesses accounting for greater shares of employment, and a much larger share of regional sales derived from export markets. Despite making up the greater share of firms, the service sectors are less important economically in terms of turnover and employment, with smaller firms and output in the knowledge intensive business services.

This economic structure presents some key policy challenges around maintaining innovation, competitiveness and output in traditional sectors with greater economic weight while developing a more diverse economic structure less susceptible to external economic conditions, and raises questions around the contribution of innovation in Burnie to growth in the service sectors and smaller firms.

What is the level, nature and role of innovation within Burnie's regional economic structure? What are the characteristics of innovative firms in Burnie and how do they differ from less innovative firms? Does innovation capacity and performance in Burnie differ from the rest of the state? We can begin to address these questions and to identify areas where Burnie might be leading or lagging by reviewing a set of standard innovation indicators.

5.1 Innovation active firms

The basic share of innovation-active firms provides an initial indication of the level of innovation activity in Burnie relative to Tasmania. A firm is defined as 'innovation-active' if it has introduced a new or significantly improved product (good or service) or process (for production or supply of products) in the 2004-2006 reference period. Table 7 shows the share of innovation-active firms, and the employment weighted share of innovation-active firms (the share of the total number of employees that work for an innovation-active firm).

Table 7. Innovation by firm size class

	Burnie		All other Tasmania	
Firm size class	**Share of innovation active firms (%)**	**Share of employment (%)**	**Share of innovation active firms (%)**	**Share of employment (%)**
All firms	**67.7**	**85.1**	**70.2**	**79.4**
5-9 FTE	65.2	64.7	65.5	65.6
10-19 FTE	57.9	60.4	68.2	68.8
20-49 FTE	72.7	73.5	74.0	74.5
50 or more FTE	88.9	92.0	82.7	85.1

There is a slightly lower share of innovation active firms in Burnie (67.7%) compared with the rest of the state (70.2%). A consistent result in innovation surveys shows the share of innovation active firms increasing with firm size, a pattern seen for all Australia[7], and a feature in the data above for Tasmania. There is a notable deviation from this pattern above for Burnie, where the share of innovation active firms in the 10-19 employee size class (57.9%) is lower than the share in the smallest size class (65.2%), and comparatively lower than in the rest of the state. Part of the explanation for this lies in the low number of firms in the data and the sectoral differences in rates of innovation activity shown below in Table 8. The general services sector has the

[7] For example see ABS (Australian Bureau of Statistics) and DITR (Department of Industry, Tourism and Resources), Patterns of Innovation in Australian Business, ABS cat 8163.0, 2006.

lowest share of innovation active firms, and also accounts for a larger share of firms in the 10-19 employee size class. There is also a slightly lower share of innovation active firms in the 20-49 size class in Burnie.

Table 7 shows a notably larger share of employees working for innovation active firms in Burnie and a comparably larger disparity with the share of innovation activity. This can be explained by Burnie's particular business demographic landscape, and may have implications for the effect and impact of innovations introduced in the larger firms (for example implementation of innovations that require upgrading of skills).

Table 8. Innovation by industry sector.

	Burnie		All other Tasmania	
Industry sector	**Share of innovation-active firms (%)**	**Share of employment (%)**	**Share of innovation-active firms (%)**	**Share of employment (%)**
All firms	**67.7**	**85.1**	**70.2**	**79.4**
Resources, utilities and construction	60.0	90.4	68.6	81.7
Manufacturing	100.0	100.0	79.5	88.7
Knowledge intensive business services	61.5	50.6	79.7	84.9
General services	56.0	65.0	62.2	70.3

In Table 8, for the Tasmanian economy (excluding Burnie) the knowledge intensive business services have the highest share of innovation active firms, followed closely by manufacturing, then resources, utilities and construction and general services the lowest.

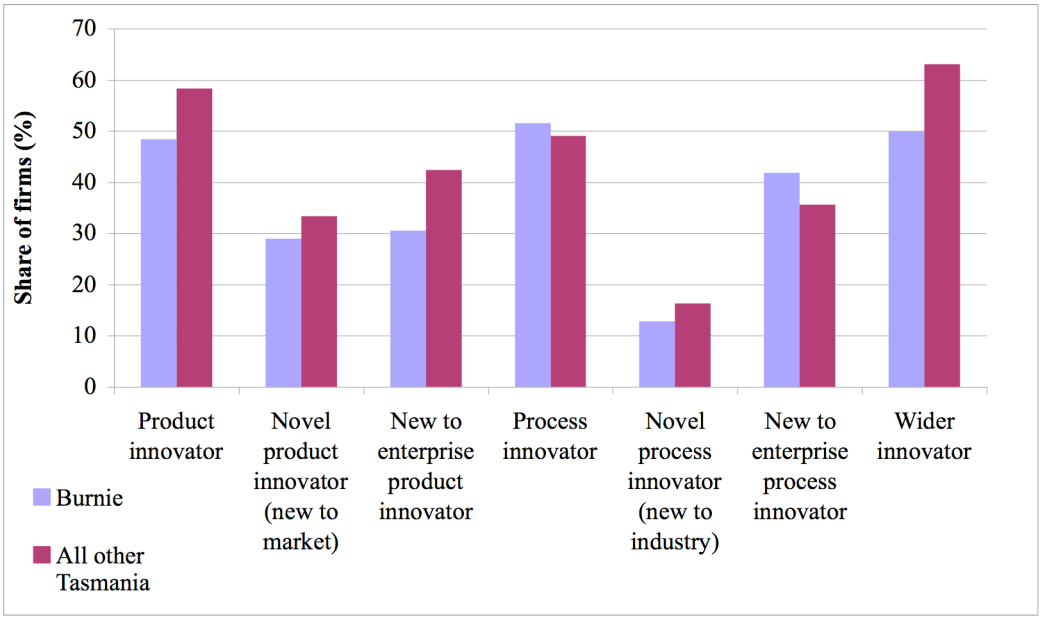
Burnie appears to deviate from this configuration with the highest share of innovation active firms in manufacturing, and a much lower share in knowledge intensive business services. Shares of innovation active firms in resources, utilities and construction and general services are also relatively lower. Though these differences are likely influenced by the small number of responding firms in Burnie and caution must be exercised in their interpretation, a point of note is the lower share of innovative firms in the service sectors.

5.2 Innovation activity by type

Although the share of innovation active firms is a widely used indicator for the basic level of innovation activity, especially when comparing region or country performance, it reveals nothing about the type, character or intensity of innovation activity. Firms can innovate in very different ways, ranging from simple buying in of existing machinery or technology to improve the production process through to undertaking creative and inventive activities leading to the development of entirely novel products. Different types of innovation have different knowledge, skills,

employment and investment implications, and can have very different economic and social outcomes. A breakdown of innovation active firms by type provides the next level of detail in exploring the character of innovation.

Figure 1. Innovation type by region



Firms are categorised as follows based on activities undertaken in the 2004-2006 reference period:

Product Innovator:
- Introduced new or significantly improved goods or services

Novel Product Innovator (New to Market):
- Introduced a new product onto the market before competitors

New to Enterprise Product Innovator:
- Introduced new to enterprise (not new to market) products

Process Innovator:
- Introduced new processes for production or supply of goods or services

Novel Process Innovator (New to Industry):
- Introduced new processes (for production or supply of goods or services) that were new to the industry

New to Enterprise Process Innovator:
- Introduced new processes (for production or supply of goods or services) that were new to the enterprise (and not new to industry)

Wider Innovator: implemented any of the following:
- A new or significantly changed corporate strategy
- Advanced management techniques
- Major changes to organisational structure
- Changes in marketing concepts or strategies

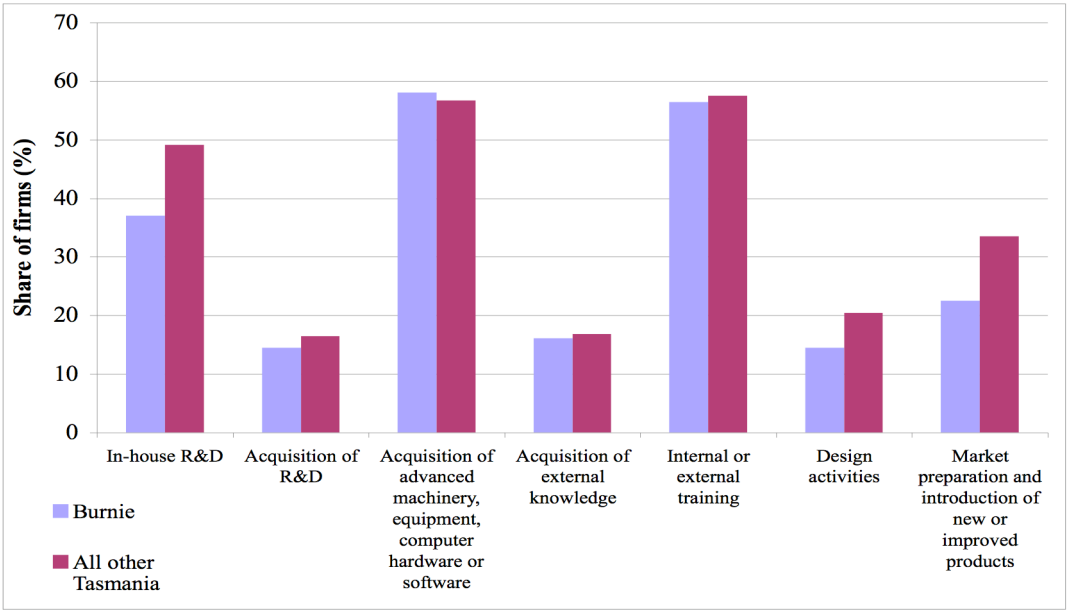
Figure 1 shows the share of firms classified by type of innovation introduced. A few points are evident from the mix of innovators. Firstly, Burnie has a slightly higher share of process innovators than the rest of Tasmania, and a higher share of new to enterprise process innovators. On face value this feature seems to suggest an important role for the import of new technology (and the knowledge associated with its application), implicating improved efficiency and reduced cost as important drivers, though further analysis is required to explain these differences. Secondly, the share of innovators across almost all types of innovation is lower in Burnie. Burnie has a lower share of product innovators, a lower share of novelty in both product and process innovation, and a lower share of organisational, managerial and marketing innovators ('wider innovators').

6 INNOVATION INPUTS - ACTIVITIES AND INVESTMENTS

To better understand the nature of the innovation process we can review specific innovation input activities and the associated investments reported. The innovation census questionnaire asked whether firms undertook particular types of innovative activity, and for expenditure figures on the particular activity in the most recent financial year (2005-2006). The majority of firms were able to provide good estimates, and as a result it is possible to review the patterns in innovation input activities and investment.

6.1 Innovation input activities

Figure 2. Innovation activities reported by region



The mix of innovation activities undertaken in Burnie appears fairly similar to that for the rest of the state. Acquisition of machinery and equipment and training are the most important activities for innovation, while a notable difference is the lower share of firms undertaking R&D, market preparation activities for introducing innovations and design. Overall Burnie has a slightly lower share of firms engaged in each innovation activity apart from the acquisition of machinery and equipment. These activity patterns are reflected in the reported expenditure shown in Table 9.

6.2 Innovation investment

Table 9. Composition of total innovation expenditure by region	Burnie (%)	All other Tasmania (%)
In-house R&D	6.2	21.5
Acquisition of R&D	1.7	2.3
Acquisition of advanced machinery, equipment, computer hardware or software	73.0	59.6
Acquisition of external knowledge	1.9	3.3
Internal or external training	12.7	5.3
Design activities	2.9	4.0
Market preparation and introduction of new or improved products	1.6	4.0
Total	**100.0**	**100.0**

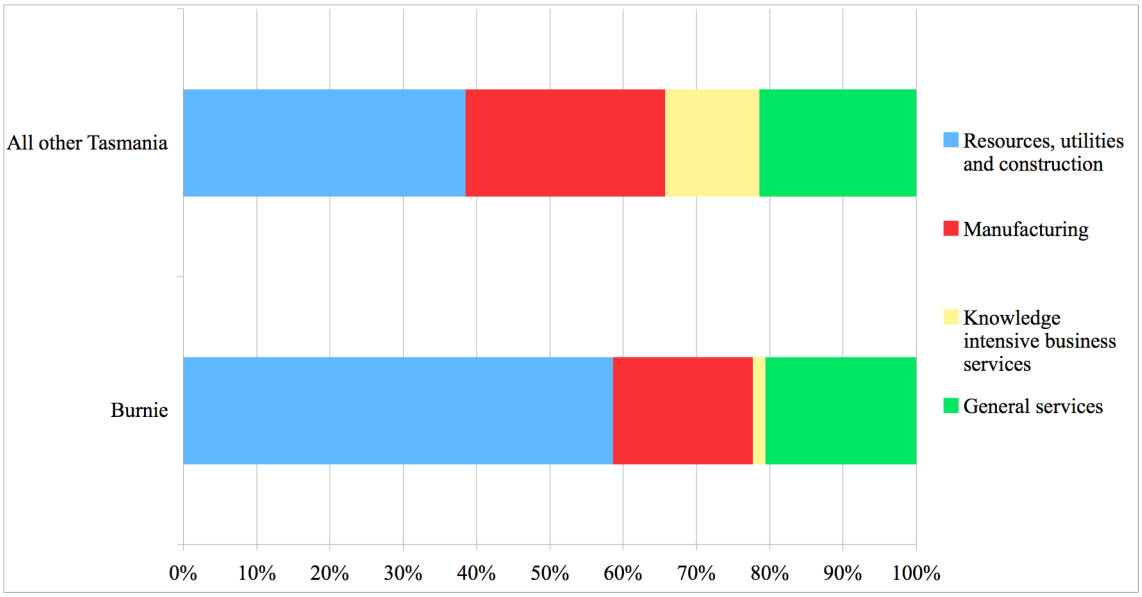
Total reported innovation expenditure in Burnie accounted for 4.4% of Tasmania's total innovation expenditure. Table 9 shows the importance of investment in machinery and equipment and training for innovation in both Burnie and the rest of the State. As might be expected from the weight of resources, utilities and construction and manufacturing sectors in the industrial base, investment in machinery and equipment accounted for a comparatively larger share of total innovation investment in Burnie with 73% compared to 59.6% for the rest of the state.

Training for innovation was also a comparatively more important innovation input in Burnie, accounting for 12.7% of total innovation expenditure, more than double the relative share in the rest of Tasmania (5.3%). Adoption and application of new technologies (in production processes) and the associated training activities required appear to be key innovation inputs in Burnie.

A much lower share of expenditure was attributed to R&D, as could be expected from the lower shares of firms undertaking R&D, while the share of acquisition of R&D was slightly less than for the state as a whole.

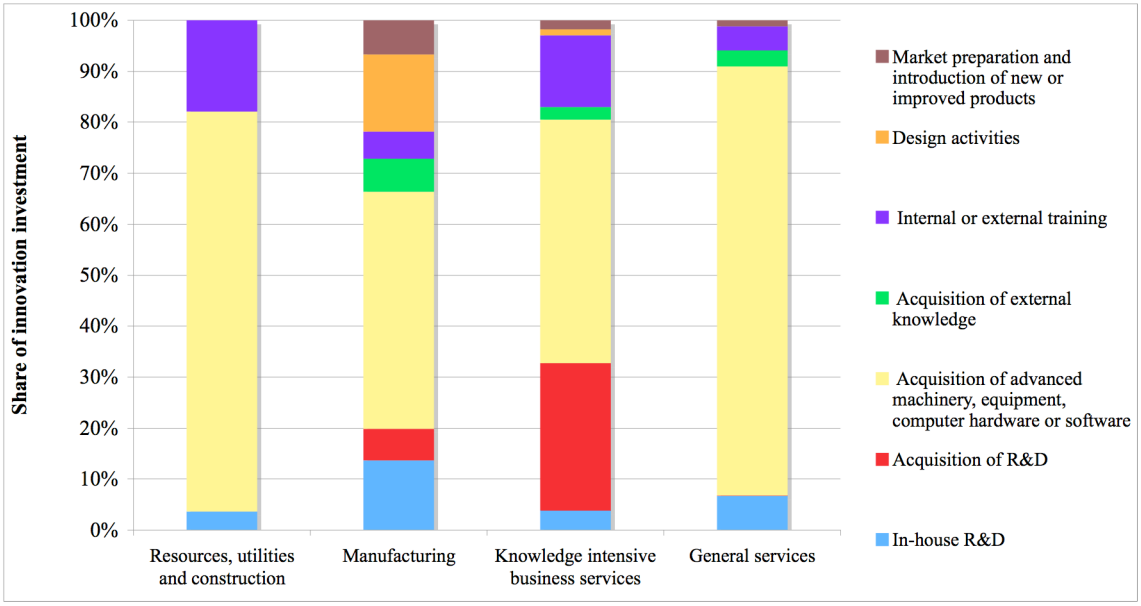
Figure 4 shows the distribution of total innovation investment/expenditure by industry sector.

Figure 4. Total investment by industry sector



Of the total innovation investment in Burnie, resources, utilities and construction is by far the larger contributor accounting for just under 60% of all investment (a greater relative share than in the rest of the state and disproportionately larger than the sectors weight indicated by employment and turnover), followed by general services with 20.6%, manufacturing with 19.1% and knowledge intensive business services with 1.7%. The specific mix of investment also differs within sectors, shown in Figure 5.

Figure 5. Total investment breakdown by industry sector in Burnie



In Burnie, acquisition of machinery and equipment for innovation is the most important area of investment for resources, utilities and construction and general services sectors, while investment in training for innovation is relatively more

important in resources, utilities and construction and knowledge intensive business services. For resources, utilities and construction, training expenditures might to relate to the application of knowledge embodied in new technology and capital equipment, while for KIBS the larger share of acquired R&D is indicative of training relating to the application and adaption of externally sourced knowledge. Understanding the nature of investments in more detail would require further investigation. In general production and acquisition of knowledge, modification of new technologies and access to new markets are more important to ongoing business in manufacturing, and this is reflected in the sectors more diverse spread of investment expenditure above, with design, R&D and marketing activities accounting for relatively larger shares of innovation expenditure.

Table 10. Total innovation expenditure per employee

	Burnie	All other Tasmania
All sectors	**$8,618**	**$10,728**
Resources, utilities and construction	$24,521	$21,658
Manufacturing	$3,679	$12,074
Knowledge intensive business services	$2,683	$8,004
General services	$6,082	$5,810

Although the average innovation expenditure per employee is similar for Burnie and the rest of Tasmania, notable industry differences are the higher level of investment per employee in resources, utilities and construction and general services in Burnie, and much lower level for knowledge intensive business services and manufacturing.

7 INNOVATION OUTPUTS - SALES

Firms in the TIC were asked to estimate the percentage of their sales that were generated from four categories of unchanged and altered (innovative) products. Innovative products consist of three categories: significantly improved products; products new to the enterprise but not new to the market; and products new to the market. Sales of innovative products provide a key indication of the outputs of innovation efforts.

7.1 Sales of innovative products

A relatively lower share of total sales were generated from innovative products in Burnie than in the rest of the state (17.2% compared to 27.8% of total sales),[8] while sales from innovative products in Burnie accounted for 1.3% of all the sales from innovative products in Tasmania.

[8] Sales values could only be derived for product innovators who answered sales questions (and reported turnover in the survey), though the non-response for the sales question was low.

Examining sales of innovative products only in Table 11 (excluding sales data for unchanged products) shows that significantly improved products contributed the greatest share with 53.1% of innovative products sales in Burnie compared with 45% in the rest of the state.

Table 11. Breakdown of sales of innovative products

	Burnie	All other Tasmania
Sales from significantly improved products	53.1	45.0
Sales from products new to enterprise but not new to market	24.1	24.2
Sales from products new to market	22.8	30.8
Total	**100.0**	**100.0**

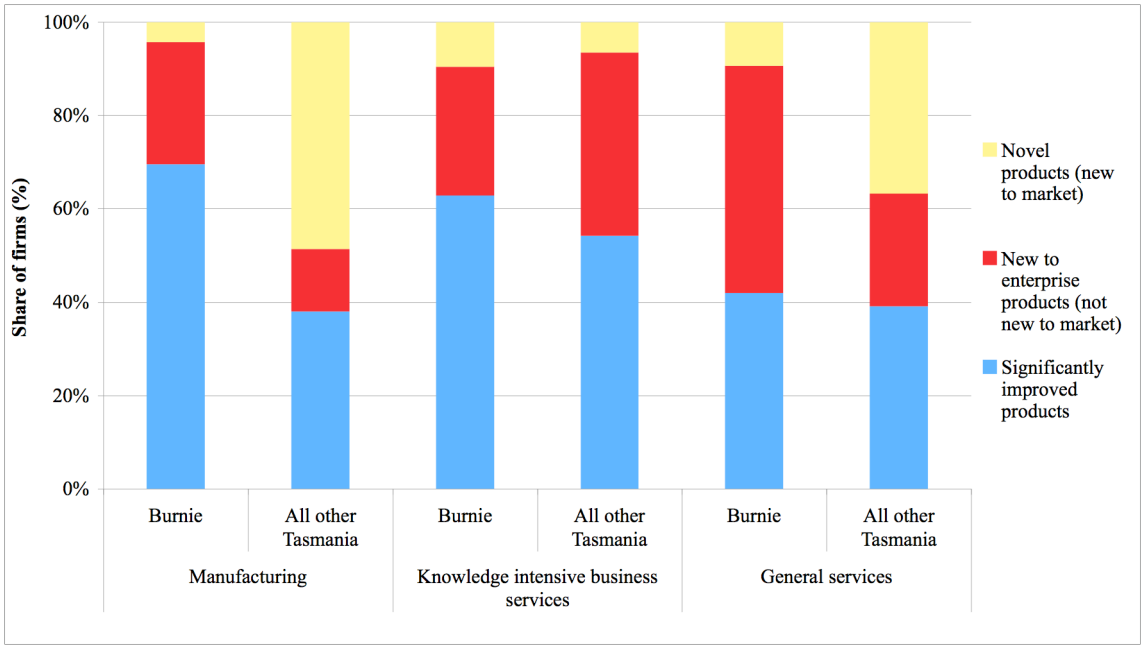
Note: A product is defined as 'significantly improved' in terms of quality, functions or intended uses; or through changes in materials, components, design, or other characteristics that enhance performance. For example, superficial changes (such as new colours or patterns on a label) would be excluded, but new packaging that improves shelf-life, or reduces costs would be included.

Table 11 indicates a lower level of novelty in Burnie compared with the rest of Tasmania, where a greater share of sales are derived from new to the market products. It appears that incremental innovation is more predominant in Burnie with upgrades and improvements to existing products. Key questions remain as to whether this particular type of innovation is more or less profitable, whether more novelty and product innovation would support growth in Burnie, and what sectors have potential for further product innovation.

Breaking down the distribution of outputs by sector in Figure 6 shows that the total share of innovative products is lower for each sector in Burnie than in the rest of the state[9].

[9] Resources, utilities and construction is omitted due to low firm numbers.

Figure 6. Breakdown of sales of innovated products by industry sector in Burnie



Comparing sectors by region in Figure 6, knowledge intensive business services in Burnie derived a higher share of sales from novel products (9.6% compared with 6.4% for the sector in rest of Tasmania), while the share from novel products in manufacturing was notably lower. In Burnie the share of sales from new to enterprise products in general services was higher than in the rest of the state (48.4% compared with 24.1%), indicating the importance of adoption and import of new knowledge and technology in this sector.

Within Burnie general services had the highest share of sales from new to enterprise and new to market products (58% of total innovative sales), while significantly improved products were more important for sales in manufacturing and knowledge intensive business service sectors.

A question emerging here is whether increases in novelty are feasible, and the potential for sales of novel products to drive growth overall through expanding into new markets.

8 COLLABORATION PATTERNS OF INNOVATING FIRMS

Innovation involves the development, acquisition, adoption, and application of new knowledge by firms, and often requires firms to search outside their existing stocks of knowledge and skills to solve innovation related problems. Collaboration activities are thus widely acknowledged as critical elements in successful innovation processes, facilitating the transfer and diffusion of new technologies and knowledge between firms, institutions and economies.

In the TIC questionnaire, collaboration was defined as 'active participation with other enterprises or non-commercial institutions aimed at developing new goods, services, or processes'[10]. Firms were asked whether they collaborated, who they collaborated with and the location of collaboration partners.

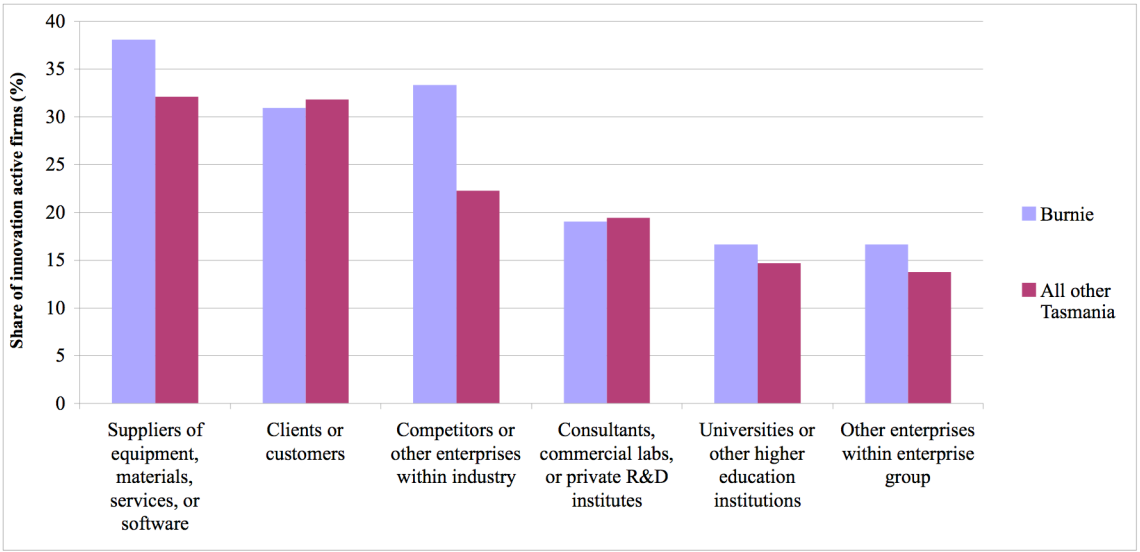
Table 12 shows that 45.2% of innovation active firms in Burnie engaged in collaboration, compared with 43.2% in the rest of the state, while a notably higher share of employees worked for collaborating firms, reflecting the general firm demographic and employment distribution.

Table 12. Collaboration by region

	Burnie	All other Tasmania
Share of firms collaborating (%)	45.2	43.2
Share of employment (%)	53.5	45.9

Figure 7 shows the type of collaboration partner used[11]. Overall the pattern of collaboration in Burnie is similar to the rest of the state, though the share of firms collaborating with 'competitors or other enterprises within industry' and 'suppliers of equipment, materials, services or software' is noticeably higher, with most supplier collaboration occurring in the service sectors.

Figure 7. Collaboration activity by partner type in Burnie



In the rest of Tasmania the highest shares of collaboration were reported in service sectors followed by manufacturing then resources, utilities and construction, while within Burnie, manufacturing had the greatest share relative to other sectors. Collaboration rates in manufacturing in Burnie were also higher compared with manufacturing outside of Burnie, while the share of service firms engaging in

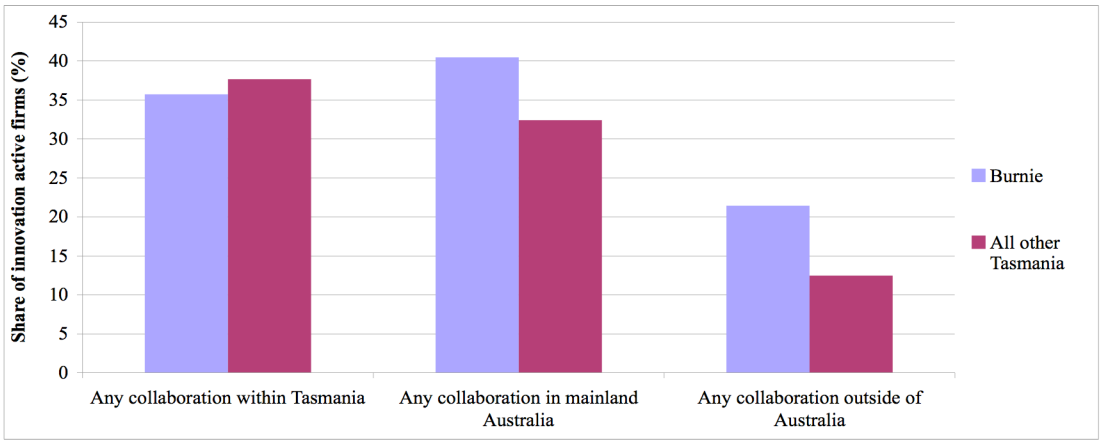
[10] Consistent with definitions in the 2005 OECD OSLO manual 3rd edition.

[11] These figures represent the firms who collaborated with a particular partner type, but do not indicate the frequency or intensity of collaboration activity.

collaboration was slightly lower comparatively. In Burnie there are higher shares of firms collaborating in the smallest firm size class (5-9 employees) and the largest firm size class (greater than 50 employees) compared with the rest of Tasmania.

Interestingly, Figure 8 shows a comparatively greater share of firms in Burnie collaborating with partners located in mainland Australia and overseas. The majority of collaboration activity with partners located on the mainland is with suppliers, clients or customers and competitors, while overseas collaboration is with clients or customers. Although these figures are impacted by the small number of contributing firms and caution needs to be exercised in their interpretation, they do suggest the existence of collaboration networks outside of Tasmania and Australia that Burnie firms are accessing and utilising, which may provide a basis for further exploitation and expansion for innovative activities in the future.

Figure 8. Collaboration reported by location in Burnie



9 PERFORMANCE OF INNOVATIVE FIRMS IN BURNIE

How important is innovation to firm level performance in Burnie? A review of the growth rates in employment and turnover reported by firms provides one indication.

Table 13. Firm growth in Burnie by innovation status

		Innovation active	Non-innovation active
Turnover growth	Mean	18.5%	5.8%
	Median	13.7%	7.7%
Employment growth	Mean	20.6%	9.4%
	Median	13.3%	4.5%

Both mean and median growth rates for turnover and employment are much greater for innovative firms in Table 13, indicating that innovative firms were growing at a faster rate than non-innovative firms over 2004-2006. A review of exports shows that innovation active firms in Burnie also derived a much higher share of sales from exports. Exports accounted for over 70.8% of sales from innovation active firms

compared with 1.4% for non-innovation active firms, though the shares of total sales from exports in the region were much higher as shown in Table 6.

10 MEASURING HOW FIRMS INNOVATE IN BURNIE – INNOVATION OUTPUT MODES

We have reviewed the innovation characteristics of firms in Burnie using a number of standard indicators for innovation type, inputs, outputs and collaboration, which showed that new to enterprise process innovation is the prevailing type in the region, that acquisition of new machinery and equipment and training were key areas of innovation investment (though inputs differed by sector), and that significantly improved products accounted for the majority of innovation sales, with some notable relative sectoral variations. All these measures are based on 'simple' indicators, which are derived from answers to single questions from the innovation census questionnaire. As we have seen, reviewing the patterns for different sets of simple indicators allows us to build a picture of the nature of innovation in Burnie. However, these simple indicators do not allow easy differentiation of the varying degrees of intensity in methods and outputs of innovation. Firms innovate in different ways, often involving multiple methods, activities and outputs, and on an ongoing basis.

Innovation is now widely acknowledged as a complex and non-linear process, involving feedback loops between firms, markets, and the knowledge or science and technology infrastructure. The innovation process can shift along a continuum of creativity, inventiveness and novelty with varying degrees of sophistication in inputs and outputs. Simple indicators have limitations when attempting to measure how firms innovate across this continuum.

More recent research in measuring firm level capabilities across this spectrum of innovation intensity focuses on 'composite' indicators, which classify firms based on answers to a series of innovation survey questions rather than a single question. Firms are classified using 'innovation modes' – classes or categories based on composite indicators[12].

With innovation 'modes' firms are assigned to one of a number of exclusive modal categories based on their answers to a series of questions. Modes can be constructed to capture various dimensions of innovation including inputs, outputs and collaborative activities. Analysis of modes facilitates a review of the distribution of innovation intensity across an economy, and within industry sectors or size classes, which may have implications for identifying particular characteristics of highly innovative firms. An example output mode based on novelty of innovation outputs is shown in Box 1, followed by a review of the firm distribution in Burnie based on this mode.

[12] See for example, Bloch C, Lopez-Bassols V. Innovation Indicators. In *Innovation in Firms: A Microeconomic Perspective*, pp. 21-68, OECD, Paris, 2009; Arundel A, Hollanders H. *EXIS: An Exploratory Approach to Innovation Scoreboards*, TrendChart, DG Enterprise, March 2005.

Box 1. Output mode based on markets	
International novel innovators	Active in overseas markets and introduced new-to-market product or new-to-industry process innovation
Domestic novel innovators	No overseas markets sales but introduced new-to-market product or new-to-industry process innovation
Modifiers	Only new-to-firm innovations but acquired R&D or knowledge from other firms or active in design
Adopters	Product or process innovator but only reports acquisition of new technology

Figure 9. Innovation output modes by region

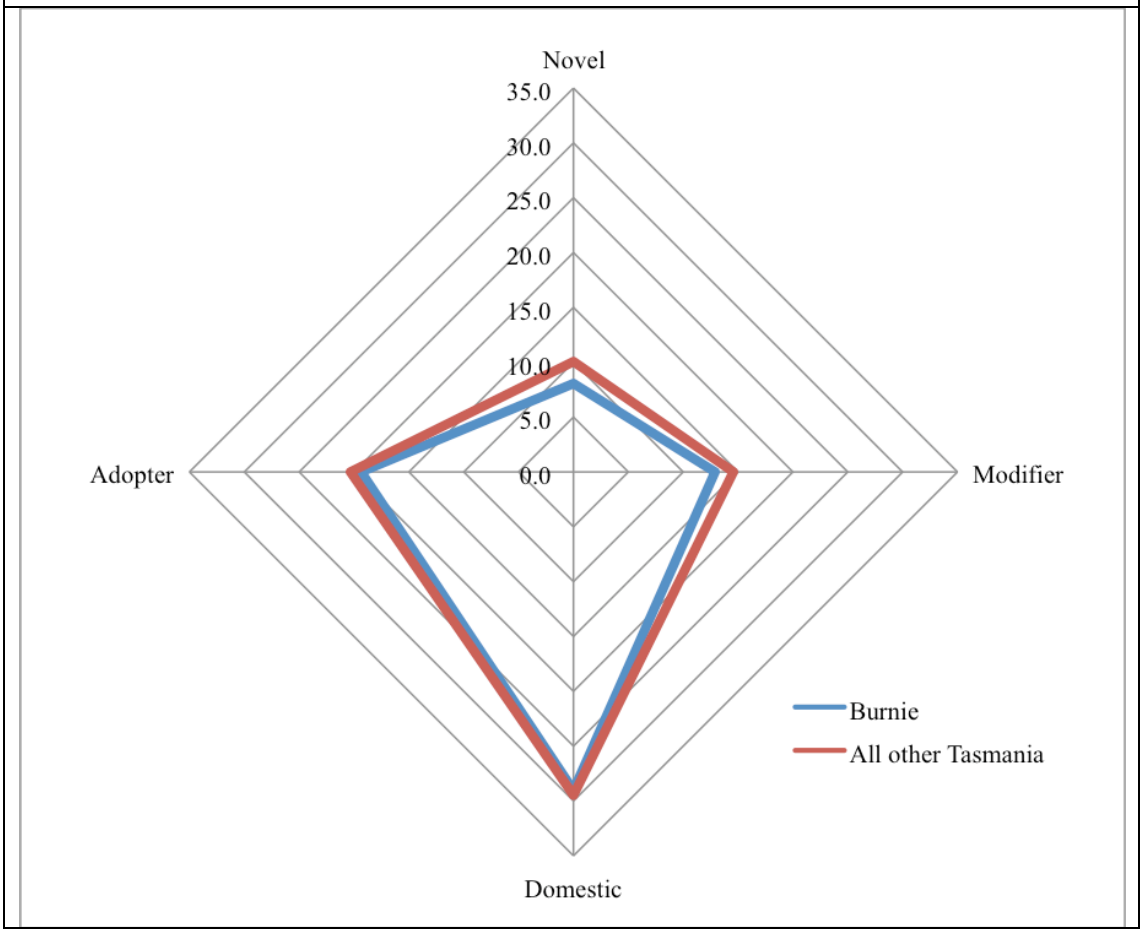


Figure 9 shows the distribution of innovative firms across the output-based mode for comparator regions. Each axis shows the innovative firms assigned to each modal category as a share of all firms in the region, with the sum of all shares in each category adding up to the total share of innovative firms for the region.

Firms in Burnie show a similar distribution across modal categories to firms in the rest of Tasmania, though with marginally smaller shares of firms in each category (less than 2%), which corresponds with the lower overall share of innovative firms. The majority of innovative firms are domestic innovators, followed by adopters,

modifiers and novel innovators which make up the smallest share. However, a review of the employment weighted shares by modal category shows a different structure[13].

Figure 10. Employment weighted modes for Burnie

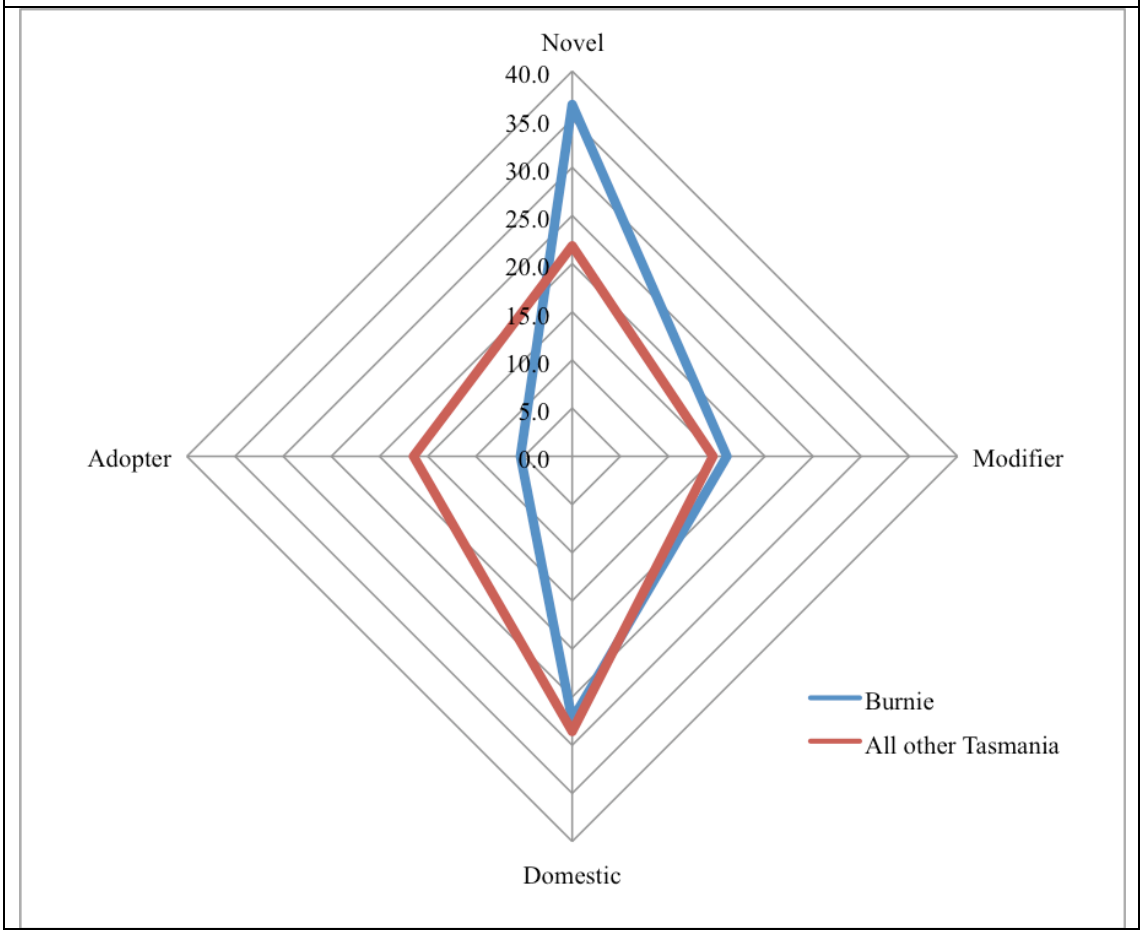


Figure 10 shows the distribution of employees who work for innovative firms by region. Each axis shows the share of total employees that work for an innovative firm classified to that modal category, with the sum of all shares in each category adding up to the share of all employees working for innovative firms. Although only 8.1% of firms in Burnie are novel innovators they account for the greatest employment share with 36.5% of total employment, followed by domestic innovators, modifiers then adopters. Though the share of employees working for novel innovators in the rest of the state is also disproportionately higher than the share of firms, the difference is not as great. This result is interesting considering that with simple indicators in Figure 1 the share of product and process novelty in Burnie was comparatively lower. The other point of note from Figure 10 is that modifiers account for a comparatively greater share of employment, while adopters account for a much lower share.

Despite these distributions likely being impacted by firm size, they still raise interesting questions about employment and the potential impact of intensity and novelty in innovation.

[13] Employment weighting shows the share of employees that work for a firm that has X characteristic, where X is a modal category in this instance.

Drilling down a level in detail we can review the distribution of firms by output based modes within each industry sector in Burnie, which provides an indication of the varying spread and importance of particular types and intensities of activity and novelty by sector, and with potential implications for understanding the impact of policy at a sectoral level.

Figure 11. Output based modes by sector in Burnie

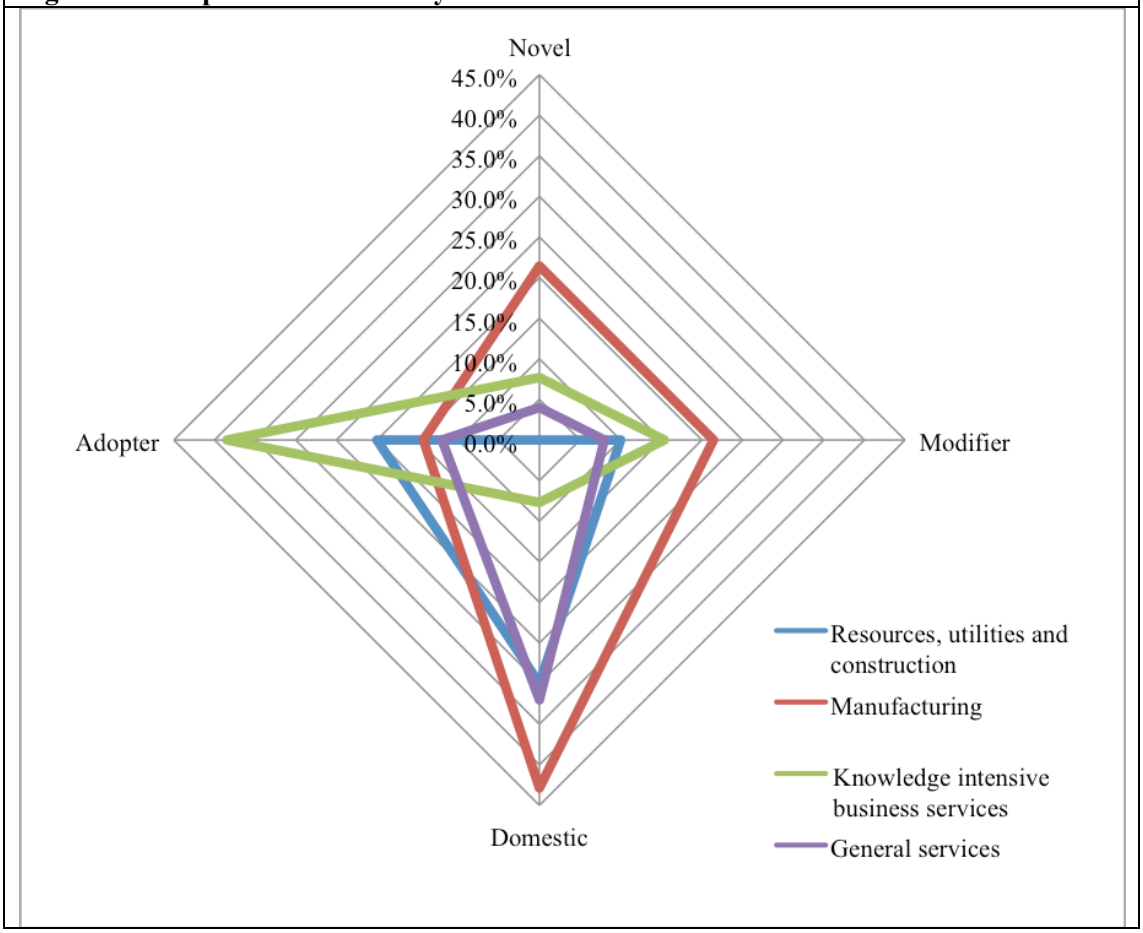


Figure 11 shows that manufacturing has the highest share of novelty followed by KIBS then general services, a pattern similar to other regions apart from the lack of firms from resources, utilities and construction falling into this category. Adoption is the most important for KIBS in Burnie, while in the rest of the state domestic innovation and modification are more important activities in KIBS. This raises interesting questions about the relationship between higher levels of innovation novelty and intensity in KIBS and growth in the sector, and what factors might influence or constrain KIBS firms in Burnie in shifting up the innovation intensity continuum - would more domestic innovation and modification in KIBS in Burnie have a positive impact on growth?

11 CONCLUSION

This report sought to utilise data from the Tasmanian Innovation Census to describe key features of the Burnie business demography and industrial structure, exploring the

innovation dynamics of the Burnie region in relation to the rest of the Tasmanian economy.

We showed that manufacturing and resources, utilities and construction sectors are central to Burnie's economy, that a smaller number of larger firms account for the majority of employment, and that services - in particular the knowledge intensive business services - are significantly smaller and less innovative according to many innovation indicators.

While a slightly lower share of firms are innovating in the Burnie region a larger share of employees work for innovative firms than in the rest of the state, a regional characteristic that indicates the importance of innovation to the region. New to enterprise process innovation is the prevailing type of innovation, and despite some sectoral variations, investment in new machinery and equipment and training for innovation are the dominant input activities. The majority of innovation sales are from significantly improved products, and a higher share of firms in Burnie are collaborating, with firms accessing mainland and overseas collaboration networks. Using innovation output mode indicators we showed that the distribution of firms by innovation intensity is similar to that in the rest of the state, though firms in the highest category of innovation intensity account for a much larger share of employment in Burnie. Reviewing modes by industry indicated some relative differences in the sectoral mix of innovation intensities.

In developing an initial quantitative profile of the industrial strengths and innovative activity specific to the Burnie region, a number of key questions have emerged that might be addressed with further data analysis, business surveys or case studies. Below are some potential areas for further investigation, that may assist in deepening knowledge and understanding of the issues around improving innovation capacity and performance, diversifying the regional economic structure and improving long term prospects for growth and prosperity in Burnie:

Barriers and drivers to innovation and growth in services firms, in particular knowledge intensive business services

- In Burnie the knowledge intensive business service sectors are smaller and less innovative than in the rest of Tasmania.
- A better understanding of the barriers and drivers to innovation and growth in services could be developed with targeted follow up surveys and case studies.

Innovation modes and novelty and firm performance

- Further analysis using additional modes and analysis of modes and growth in turnover and employment to progress understanding of the link between particular types of innovation activity and firm performance.

A review of research on policies and programs for growing KIBS in regional economies

- A review of existing regional policies aimed at stimulating KIBS in regional economies (particularly in very small economies) and investigation of

existing evidence to support the success of failure of particular policies[14].

ICT as an input to services innovation and the impact of the National Broadband Network infrastructure

- A review of the role of Information and Communication Technologies (ICT) as an input to regional innovation processes, and the potential for the National Broadband Network (NBN) infrastructure to improve innovation and growth opportunities, particularly in the service sectors.

Novelty in product and process innovation and value-adding

- Is the lower rate of product innovation simply a function of industrial structure or are there opportunities for further value-adding through increases in product innovation (in traditional and non traditional sectors)? What evidence is there to suggest that increasing levels of product and process innovation novelty would be beneficial in terms of firm growth in Burnie? What are the constraints for further novelty and the factors that might stimulate increases in novelty?

[14] KIBS firms are widely acknowledged as innovation intermediaries, acting as agents for facilitating the transfer and diffusion of knowledge, and playing a key role in supporting cross-sectoral innovation and economic growth. There is a recognised gap in the literature in terms of understanding the role of KIBS in regional economies and an increasing number of studies in this area, though the regions of analysis in many studies of regional economies and innovation systems are often much larger than Burnie and Tasmania. See for example, Thomi, W & Bohn, T. *Knowledge Intensive Business Services in Regional Systems of Innovation – Initial Results from the Case of Southeast-Finland*, 43rd European Congress of the Regional Science Association, 2003; Koch, A, Stahlecker, T. *Regional Innovation Systems and Foundation of Knowledge Intensive Business Services. A Comparative Study in Bremen, Munich, and Stuttgart, Germany,* European Planning Studies Vol. 14, no. 2, February 2006.

12 APPENDIX A – TIC QUESTIONNAIRE

Tasmanian Innovation Census
Survey Questionnaire

Version 2.7 - 9 August 2007

Australian Innovation Research Centre
University of Tasmania

ID _____

Time actual interview started _____: _____ 24 hour time

Date started _____ / _____ / 2007

Good morning/afternoon, I'm calling on behalf of the Australian Innovation research Centre at the University of Tasmania.

I'm calling about an innovation project that the University of Tasmania is currently undertaking in collaboration with the Department of Economic Development.

Recently a letter was sent explaining the project, did you get a chance to read that letter?

The project aims to study innovation across different industries in Tasmania, exploring the development of new products and processes in Tasmanian businesses.

It aims to provide researchers and Policy makers with an understanding of what innovation is occurring in Tasmania, so that they can develop better forms of support for Tasmanian firms, and better polices to support innovation in Tasmania and improve the Tasmanian economy.

What the project involves is a short telephone questionnaire. It takes around10 to 20 minutes. Would you be willing to participate in the survey now? [If no] Would it be possible to schedule a time to complete the questionnaire?

In this survey, the questions are about [business name]'s whole business enterprise in Tasmania.

Q1. To start with, could you describe the activity from which [business name] derives its main income?

Q2a. Is [business name] part of an enterprise group, that is, two or more enterprises under common ownership?

Please cross one box only

Yes ☐

No ☐

Q2b. Is your headquarters in Tasmania, in mainland Australia or Outside of Australia:

Please cross one box only

In Tasmania ☐

In Mainland Australia ☐

Outside of Australia ☐

(If the enterprise is part of an enterprise group) In the rest of these questions "your enterprise" refers <u>only</u> to [business name] in Tasmania.

Q2c. Does [business name] have more than one location or establishment in Tasmania?

Please cross one box only

Yes ☐

No ☐ → Go to Q3

Q2d. (If yes) What was the number of locations operated by [business name] as at 30 December 2006?

_____

The next question asks for the percentage distribution of sales revenue between markets in Tasmania, Australia and Overseas.

Q3. Please estimate the percentage of your revenues in the 2005-2006 Financial Year (ended June 30 2006) that came from the sale of goods or services in:

a. Tasmania ____%

b. Mainland Australia ____%

c. Outside of Australia ____%

The next section is about new or improved goods or services at [business name]

When we say that, we are talking about the market introduction of a good or service that is new or significantly improved.

That could mean that the good or service is completely new and different to goods or services previously produced by the enterprise.

That can also mean that the good or service is significantly improved in terms of quality, functions or intended uses; or significantly improved through changes in materials, components, design, or other characteristics that enhance performance.

For example, we would exclude superficial changes (such as new colours or patterns on a label), but include new packaging that improves shelf-life, or reduces costs.

The new good or service does not need to be new to your market, only to your enterprise, and it does not matter if the new good or service was originally developed by your enterprise, or by other enterprises.

We don't include the simple resale of new goods purchased from other enterprises.

Q4. During the past three calendar years, 2004, 2005 and 2006, did your enterprise introduce:

		Yes	No
a.	New or significantly improved goods.	☐	☐
b.	New or significantly improved services	☐	☐

(If 'no' to both options above go to Question 8, otherwise Q5a:)

Q5a. During the 3 years from 2004 to 2006, were any of these goods or services new to your market, that is where your enterprise introduced a new good or service onto your market before your competitors?

Please cross one box only

Yes ☐

No ☐

Q5b. During the 3 years from 2004 to 2006, were any of these goods or services only new to your enterprise, that is where you introduced a new good or service similar to a product already available from your competitors?

Please cross one box only

Yes ☐

No ☐

The next question applies to goods or services during the three calendar years 2004 to 2006.

The question asks how much of your turnover is due to goods or services that were unchanged during 2004 to 2006, and how much of your turnover is due to goods or services introduced during 2004 to 2006 that were new or improved.

We ask about turnover for the 2005-2006 financial year only (ended June 30 2006), and we ask for a percentage of turnover.

We are interested in the distribution of turnover between sales of goods or services that were unchanged, significantly improved, new to your enterprise but not your market, and new to your market.

Q6.

a. What percentage of your 2005-2006 turnover, was from goods or services that were **unchanged**, or only marginally modified during 2004 to 2006? _____%

b. What percentage of your 2005-2006 turnover, was from goods or services introduced during 2004 to 2006, that were **significantly improved?** _____%

c. What percentage of your 2005-2006 turnover, was from goods or services introduced during 2004 to 2006, that were **new to your enterprise but not to your market?** _____%

d. What percentage of your 2005-2006 turnover, was from goods or services introduced during 2004 to 2006 that were **new to your market**? _____%

Total turnover in 2006 100%

Q7. During the past three calendar years 2004 to 2006, were any of [business name]'s new or improved goods or services sold to the following industries in Tasmania?

	Yes	No
a. The mining industry	☐	☐
b. Engineering	☐	☐
c. Forestry or forest products (i.e. wood, pulp and paper)	☐	☐
d. The food processing industry	☐	☐
e. Fishing or Aquaculture	☐	☐
f. Agriculture or horticulture	☐	☐
g. The wine industry	☐	☐

The next section is about Process Change

*A New Process is the use of new or significantly improved **methods** for the production or supply of goods and services. Purely organisational or managerial changes should not be included - these will be covered shortly.*

The new process must be new to your enterprise, but it does not need to be new to your industry. Again, it does not matter if the new process was originally developed by your enterprise or by other enterprises.

Q8a. During the three calendar years 2004 to 2006, did your enterprise introduce any new or improved processes for producing or supplying goods or services?

Yes ☐

No ☐ ⟶ Question 9

Q8b. Were any of these processes new only to your enterprise and not to the industry?

Yes ☐

No ☐

Q8c. Were any of these processes new to the industry?

Yes ☐

No ☐

Q9. Does [business name] plan to introduce a new good, service or process within the next three calendar years 2007, 2008 or 2009?
Please cross one box only

Yes ☐

No ☐

Now a few questions about expenditure

Q10, Q11, Q12. During the three years 2004 to 2006, did your enterprise engage in […]? (When 'yes') What was your approximate expenditure on […] in the 2005/6 financial year only?

Please cross one box for each category

		Yes	No	$ 2005/6	% of Turnover in 2005/2006 Financial year
a.	**In-house research and development for new products or processes,** *that is, creative work undertaken within your enterprise on an occasional or regular basis to increase the stock of knowledge and its use to devise new and*	☐	☐ If no ski		

	improved goods, services and processes		p to Q15		

The next questions ask for a "yes" or "no" response to a number of answer categories.

Q13. Does your enterprise's in-house R&D fall into any of the following application areas?

	Application area	Yes	No
a.	Plant production and plant products	☐	☐
b.	Animal production and animal products	☐	☐
c.	Mineral resources excluding energy	☐	☐
d.	Energy resources	☐	☐
e.	Energy supply	☐	☐
f.	Manufacturing	☐	☐
g.	Construction	☐	☐
h.	Transport	☐	☐
i.	Information and Communication services	☐	☐
j.	Commercial services and tourism	☐	☐
k.	Other application area not mentioned	☐	☐

Q14. Does your enterprise's in-house R&D fall into any of the following research fields?

	Research fields	Yes	No
a.	Mathematical sciences	☐	☐
b.	Physical sciences	☐	☐
c.	Chemical sciences	☐	☐
d.	Earth sciences	☐	☐
e.	Biological sciences	☐	☐
f.	Information, Computing and Communication Sciences	☐	☐
g.	Engineering and Technology	☐	☐
h.	Agricultural, Urban environment and Building	☐	☐
i.	Medical and Health Sciences	☐	☐
j.	Other research field not mentioned	☐	☐

Q15, Q16, Q17. During the three calendar years 2004 to 2006, did your enterprise engage in […]? (When 'yes') What was your approximate expenditure on […] in the 2005/6 financial year only?

		Yes	No	$ 2005/6	% of Turnover in 2005/2006 Financial year
b.	**Acquisition of research and development from other organisations,** *that is, R&D purchased by your enterprise and performed by other companies, including other enterprises within your group or by public or private research organisations.*	☐	☐		
c.	**Acquisition of advanced machinery, equipment, computer hardware or software** *to produce new or improved goods, services, production processes, or delivery methods*	☐	☐		
d.	**Acquisition of external knowledge:** *Purchase or licensing of patents and non-patented inventions, know-how, and other types of knowledge from other enterprises or organisations.*	☐	☐		
e.	**Internal or external training** *for your personnel specifically for the development and/or introduction of new or improved goods, services and processes.*	☐	☐		
f.	**Design activities,** *outside of the R&D phase for the development or implementation of new or improved goods, services and processes.*	☐	☐		
g.	**Activities for the market preparation and introduction** *of new or improved goods and services, including market research and launch advertising.*	☐	☐		

The next question is about collaboration. We define collaboration as active participation with other enterprises or non-commercial institutions aimed at developing new goods, services or processes. Both partners do not need to benefit commercially, or share risks. Exclude pure contracting out of work with no active collaboration.

Q18. Did [business name] engage in any collaboration with other enterprises or institutes during the three calendar years 2004 to 2006?

Yes ☐

No ☐ ⟶ Question 20

The next question asks for a "yes" or "no" response to whether your enterprise has collaboration partners, and whether they were located in Tasmania, Australia or Outside of Australia. Collaboration partners can be in more than one location.

Q19. Did [business name] collaborate with (*read for each category a to g***).**

(*If 'yes' ask* **) Were they located - within Tasmania … in Mainland Australia … Outside of Australia?**

Please cross all that apply

Type of collaboration partner		Within Tasmania	Mainland Australia	Outside of Australia
a.	Other enterprises within your enterprise group	☐	☐	☐
b.	Suppliers of equipment, materials, services, or software	☐	☐	☐
c.	Clients or customers	☐	☐	☐
d.	Competitors or other enterprises in your industry	☐	☐	☐
e.	Consultants, commercial labs, or private R&D institutes	☐	☐	☐
f.	Universities or other higher education institutions	☐	☐	☐
g.	Public research institutes or CRCs (Cooperative Research Centres)	☐	☐	☐

The next section is about support received for the development of new goods, services or processes. *(This includes financial support via tax credits or deductions, grants, subsidised loans, and loan guarantees. This excludes research and other innovation activities conducted entirely for the public sector under contract)*

Q20. During the three calendar years 2004 to 2006, did your enterprise receive any financial support for new good, service, or process development activities from [*a and b below*]?

	Yes	No
a. State government authorities	☐	☐
b. Federal Government (including their government agencies or ministries)	☐	☐
c. (*If yes in a or b***)** did **your enterprise** claim a tax credit for R&D performed for any year between 2004 and 2006?	☐	☐

In this next section we ask about new forms of organisation, business structures or practices aimed at improving efficiency, or new approaches to markets and customers.

The question asks for a "yes" or "no" response to a number of answer categories.

Q21. During the three calendar years 2004 to 2006, did your enterprise make major changes in the following areas of business structure and practices?

Please cross one box for each category

	Yes	No
a. Implementation of a new or significantly changed **corporate strategy**	☐	☐
b. Implementation of **advanced management techniques** within your enterprise, e.g. knowledge management systems	☐	☐
c. Implementation of major changes to your **organisational structure**, e.g. introduction of cross-functional teams, outsourcing of major business functions.	☐	☐
d. Implementation of changes in **marketing concepts or strategies** *(e.g. packaging or presentational changes to a product to target new markets, or new activities to open up new markets)*	☐	☐

And finally some basic economic information about your enterprise

Turnover is defined as the market sales of goods and services based on the amount earned; **include** exports and taxes, but **exclude** GST.

Q22. What was your enterprise's total turnover from its Tasmanian operations for the 2005-2006 financial year? What was it two years earlier, for the 2003/4 financial year?

a. 2005/6 **b. 2003/4**

$_____ $_____

Informed estimates are fine if exact figures are not available

(*If unable or unwilling to estimate*,**)** can you tell us which of the following six broad categories your enterprise falls into? (Read all categories and circle relevant code)

2005-2006	**Code**	**2003-2004**	**Code**
$1Million or less	1	$1Million or less	1
$5 Million or less	2	$5 Million or less	2
$10 Million or less	3	$10 Million or less	3
$50 Million or less	4	$50 Million or less	4
$100 Million or less	5	$100 Million or less	5
Over $100 Million	6	Over $100 Million	6

The next question is about the number of employees at [business name].

Q23. During the last pay period ending in December 2006, how many employees were there who worked [ask for a to c below]?

a.	Full time that is 35 or more Hours per week	
b.	Part time, that is less than 35 hrs per week on a regular basis	
c.	Irregular hours or were there for seasonal work	

If there were employees working irregular hours or there for seasonal work, then ask d:

d.	For employee's working irregular hours or there for seasonal work, could you estimate how many full time people they were the equivalent of during the whole 2006 calendar year?	

Next, we ask the same questions about the number of employees two years earlier:

Q24. During the last pay period ending in December 2004 how many employees were there who worked [ask for a to c below]?

a.	Full time that is 35 or more Hours per week	
b.	Part time, that is less than 35 hrs per week on a regular basis	
c.	Irregular hours or were there for seasonal work	

If there were employees working irregular hours or there for seasonal work, then ask d:

d.	For employee's working irregular hours or there for seasonal work, could you estimate how many full time people they were the equivalent of during the whole 2004 calendar year?	

Q25. During the last pay period ending in December 2006, approximately what number of your enterprise's employees were educated to degree level or above in science or engineering subjects? … What about other subjects?

Note: If respondent has difficulty providing a number, then ask if they can provide their answer as a percentage of total no of employee's

	December 2006	
a. Science and engineering subjects	_ _ _ (Number) OR	_ _ _%
b. Other subjects	_ _ _ (Number) OR	_ _ _%

The final question is an open ended one.

Q26. Could you briefly describe your most important innovation in the past three years?

Q27. If I have any further questions or need further clarification will I be able to call you back on this number?

Yes ☐

No ☐ Other number _____

Notes:

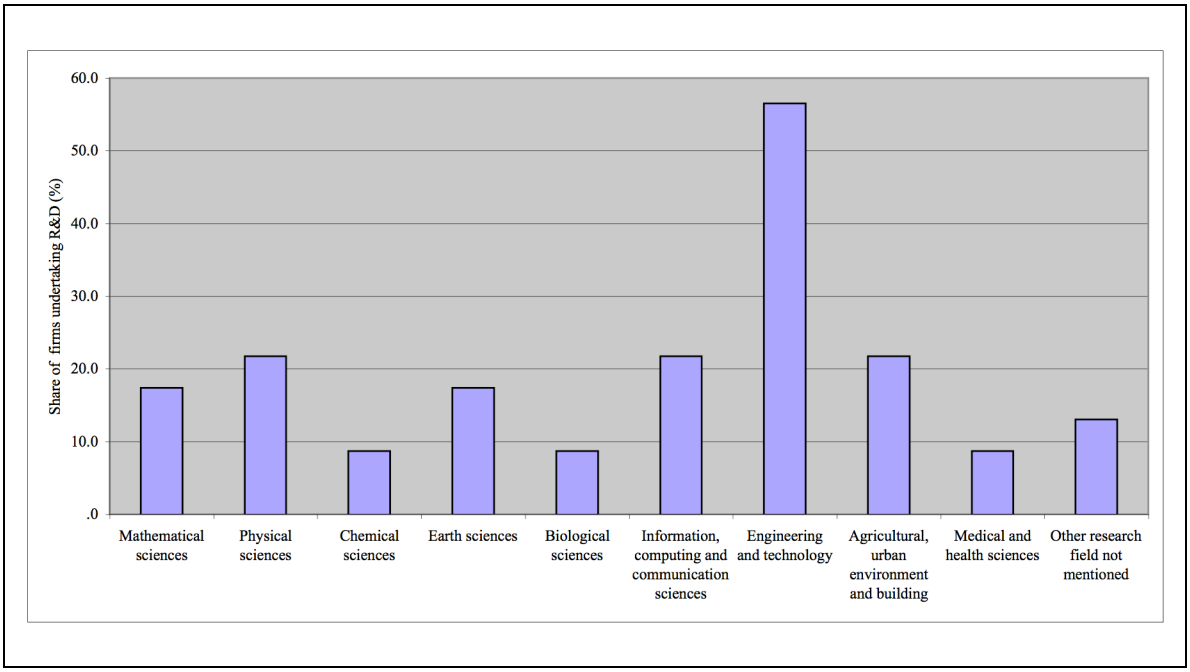
That's the end of the survey, thank you very much for your time.

Time finished _____: _____ 24 hour time

Date finished _____ / _____ / 2007

Interviewer Signed _____

13 APPENDIX B – R&D activity by application area



Firms undertaking R&D[15] were asked to classify their R&D activities by categories of application area - the field of economic or public activity to which the results of R&D might be applied. The results are shown above. The three largest application areas for R&D undertaken by Burnie firms are manufacturing, information and communication services, and transport. This reflects the fact that manufacturing is the locus of regional R&D activity, followed by resources, utilities and construction in terms of investment. The fact that information and communication services is the second most cited application area for R&D indicates the ongoing importance of the diffusion of ICT knowledge, technology and expertise across the regional economy, as an innovation input.

[15] Of all firms in Burnie, 37.1% reported undertaking R&D, compared with 49.2% of firms in the rest of Tasmania.